

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



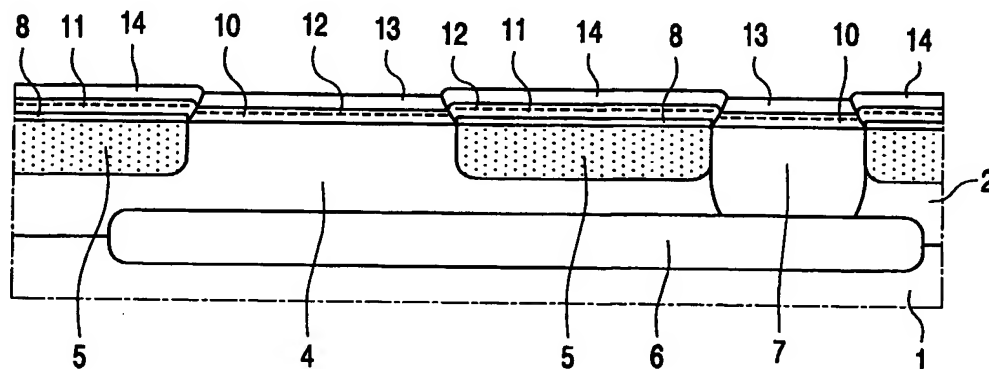
(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/057654 A3

- (51) International Patent Classification⁷: **H01L 21/20**
- (21) International Application Number:
PCT/IB2003/006017
- (22) International Filing Date:
16 December 2003 (16.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
02080509.9 20 December 2002 (20.12.2002) EP
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (71) Applicant (for DE, FR, GB, JP only): **INTERUNIVERSITAIR MICROELEKTRONICA CENTRUM VZW** [BE/BE]; Kapeldreef 75, B-3001 Leuven (BE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MAGNEE, Petrus, H., C.** [NL/BE]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **DONKERS, Johannes, J., T., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **SHI, Xiaoping** [NL/BE]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agent: **DUIJVESTIJN, Adrianus, J.**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:
14 October 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD OF MANUFACTURING A SEMICONDUCTOR DEVICE



(57) Abstract: Method of manufacturing a semiconductor device, in which on a region of silicon oxide (5) situated next to a region of monocrystalline silicon (4) at the surface (3) of a semiconductor body (1), a non-monocrystalline auxiliary layer (8) is formed. The auxiliary layer is formed in two steps. In the first step, the silicon body is heated in an atmosphere comprising a gaseous arsenic compound; in the second step it is heated in an atmosphere comprising a gaseous silicon compound instead of said arsenic compound. Thus, the regions of silicon oxide are provided with an amorphous or polycrystalline silicon seed layer in a self-aligned manner.

WO 2004/057654 A3

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 03/06017

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L21/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| A | US 5 110 757 A (ARST MARGARETH C ET AL) 5 May 1992 (1992-05-05) column 4, line 43 - column 5, line 4; figure 1 | 1-7 |
| A | US 5 491 107 A (TURNER CHARLES L ET AL) 13 February 1996 (1996-02-13) abstract | 1-7 |
| A | US 6 048 781 A (MANNING MONTE ET AL) 11 April 2000 (2000-04-11) claim 1 | 1-7 |
| A | US 5 310 698 A (WILD BARBARA) 10 May 1994 (1994-05-10) claim 1; figure 1 | 1-7 |
| | ----- -/-- | |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

* & * document member of the same patent family

Date of the actual completion of the international search

30 July 2004

Date of mailing of the international search report

09/08/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Wolff, G

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 03/06017

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | Relevant to claim No. |
|--|--|-----------------------|
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | |
| A | US 5 942 286 A (GWO SHANGJR ET AL) 24 August 1999 (1999-08-24) claim 1 | 1-7 |
| A | US 6 344 673 B1 (BUCHET CORINNE ET AL) 5 February 2002 (2002-02-05) claims 1-7 | 1-7 |

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 03/06017

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|----|---------------------|----------------------------|---------------------|
| US 5110757 | A | 05-05-1992 | NONE | |
| US 5491107 | A | 13-02-1996 | NONE | |
| US 6048781 | A | 11-04-2000 | US 5792700 A | 11-08-1998 |
| US 5310698 | A | 10-05-1994 | EP 0491976 A1 | 01-07-1992 |
| | | | DE 59010916 D1 | 30-11-2000 |
| | | | IE 914500 A1 | 01-07-1992 |
| | | | JP 4293228 A | 16-10-1992 |
| | | | KR 234228 B1 | 15-12-1999 |
| US 5942286 | A | 24-08-1999 | JP 2788984 B2 | 20-08-1998 |
| | | | JP 9108565 A | 28-04-1997 |
| US 6344673 | B1 | 05-02-2002 | NONE | |